BRIEFER ARTICLES

DEVELOPMENT OF THE ZYGOSPORE OF RHIZOPUS NIGRICANS

(PRELIMINARY NOTICE)

In growing *Rhizopus nigricans* for laboratory use, there was produced an unusual abundance of zygospores. This supply of material, and the increasing interest in the Mucorales in general, made it seem worth while to investigate the development of the zygospore of this species. Since completion of the investigation is temporarily delayed, the results so far obtained seem to be of sufficient interest to warrant the publication of a preliminary account.

There is a streaming of protoplasm with nuclei into the young suspensors, followed by a denser accumulation at the contact ends of the suspensors.

Before the gametangia are cut off, there appears a difference in the density and staining capacity of the protoplasm of the two suspensors, and this difference persists until the zygospore is mature.

The walls, cutting off the gametangia from each other, may not be formed simultaneously, and in each wall there is left a central pore. The wall which separates the gametangia from each other often thickens considerably before disintegration, and fragments of the thickened wall may be found in quite old zygospores. In the majority of zygospores the wall breaks down before any thickening occurs. In the late stages of the zygospore there is developed by the protoplast a thick, colorless, echinate coat, from which the brown coat may be removed, leaving the zygospore intact.

The many nuclei from each gametangium increase in size after the disintegration of the wall. All the nuclei except two disintegrate, and these two nuclei are imbedded in a coenocentrum. Preparations were submitted to Professor F. L. STEVENS, and he also identified this body as being like the coenocentrum of *Albugo*. There are indications that the coenocentrum has its origin at the point of contact of the two suspensors before the gametangia are cut off; but this needs further investigation. Neither fusion nor division of the nuclei has yet been observed. It is believed, however, that the two nuclei, left in the coenocentrum, fuse. From this stage to maturity many changes occur in the appearance of

the zygospore, but their interpretation is not yet clear. The coenocentrum persists until quite late, and in the mature zygospore there are many nuclei of the same size as those in the mycelium.

Oil is diffused throughout the young zygospore, but later the oil collects in larger globules. In the mature zygospore there is usually only one globule of oil in the center, and the protoplasm, unmixed with oil, is pressed in a comparatively thin layer against the wall.

These observations are based on the examination of over 2000 zygospores, sectioned serially, and much more material must be examined before the detailed account with illustrations will appear.—FLORENCE A. MCCORMICK, *The University of Chicago.*

A NEW CALIFORNIAN CEANOTHUS

Ceanothus fresnensis Dudley, sp. nov.—Low shrub, forming rounded mats, 2–4 dm. high, with stout rigid branches, young twigs tomentose: leaves opposite, oblanceolate to (and more commonly) broadly obovate, entire or usually irregularly denticulate toward the summit, coriaceous and involute, densely tomentose on both surfaces when young, glabrate above in age; petioles 1 mm. long, tomentose: umbels terminating very short branchlets; fruiting pedicels 8–12 mm. long: capsule 6 mm. high, about 5 mm. broad; horns subterminal, erect or spreading, 1 mm. long; styles very slender, divided to below the middle.

In foliage aspect this species closely resembles some forms of *Ceanothus vestitus*, but that is an erect shrub, often a meter high or more, with much smaller capsules, which are broader than long, and which have minute dorsal horns. In fruit characters it is closely akin to *Ceanothus cuneatus*, from which it differs primarily in its low habit and small tomentose, denticulate leaves.

The name, *Ceanothus fresnensis*, was proposed by the late Professor W. R. DUDLEY some ten years ago for a plant collected by HALL and CHANDLER in the southern Sierra Nevada. The label on the type specimen, which is deposited in the Dudley Herbarium of Stanford University, reads as follows: "Stevenson Mts., Pine Ridge, Fresno County, California, altitude 5300 feet, only locality seen. Growing with *C. cordulatus*." HALL and CHANDLER 407, June 1900. During the past summer I found another small colony about 100 miles north of the original station, at Confidence, Tuolumne County, where it was growing on a dry ridge at an altitude of 4000 feet in open yellow pine woods associated with *C. cordulatus* (ABRAMS 4727).—LEROY ABRAMS, *The Dudley Herbarium, Stanford University.*